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DEPARTMENT OF NOTES, REVIEWS, ETC.

It is the purpose, in this department, to present from time to time brief original notes, both of methods of work and of results, by members of the Society. All members are invited to submit such items. In the absence of these there will be given a few brief abstracts of recent work of more general interest to students and teachers. There will be no attempt to make these abstracts exhaustive. They will illustrate progress without attempting to define it, and will thus give to the teacher current illustrations, and to the isolated student suggestions of suitable fields of investigation.—[Editor.]

ENTOMOLOGICAL NOTES

Hæmoglobin in Chironomus.—Leitch ('16, Journ. Physiology, 50:370-379) reports results of investigations on "The Function of Hæmoglobin in Invertebrates with special Reference to Planorbis and Chironomus Larvæ." Hæmoglobin occurs in certain Chætopoda, Nemertea, Hirudinea, Gephyrea, Lamellibranchiata, Gastropoda, Brachiopoda, Ostracoda, Copepoda, the larvæ of Musca, and the larvæ of Chironomus. Obviously, zoological kinship is not correlated with the presence of hæmoglobin, but it appears that its occurrence among invertebrates is correlated with a habitat deficiency in oxygen. In connection with experiments to determine the use and suggested storage function of hæmoglobin, it was found that the hæmoglobin makes available "by its power of binding oxygen chemically, a quantity of oxygen sufficient for the needs of the animals at oxygen tensions so low that the necessary amount is not supplied by physical solution." There is no storage of oxygen but the action consists in the "constant binding of oxygen at the surface of the body and the constant giving up of it in the interior: a continuous mixing and interchange of oxidized and reduced blood kept in motion by the beating of the heart."

Reactions of Drosophila.—Cole ('17, Journ. Animal Behavoir, 7:71-80), in an experimental study of the reactions of *Drosophila ampelophila,* finds that this insect, when creeping, shows negative reaction to gravity, to centrifugal force which is equal to or slightly greater than gravity, and to currents of air without regard to other stimuli. It is shown that gravity is both a *kinetic* and a *directive* stimulus. Apparently, the stimuli causing these responses are received by the sensory nerves of the leg muscles. However, it seems probable that the flying reactions of this insect are not influenced at all by gravity.

Insect Blood Cells in Vitro.—Glaser ('17, Psyche, 24:1-6) has experimented with the cultivation of insect blood cells in artificial cultures. Using the caterpillars of *Malacosoma americanum, Cirphis unipuncta, Laphygma frugiperda,* and *Porthetria dispar* as sources of material, cultures were made of the corpuscles in their own plasma, in Locke's solution, or in a mixture of the two. Preparations made from the second and third named species were kept alive for over a month without washing out the cultures or transference to fresh media. Cultures of blood cells taken from the last-mentioned species were kept alive for seventeen weeks without washing or renewal of the media. In such cases, the cells were no longer vigorous and exhibited signs of degeneration, but when these old cultures were washed out and renewed with fresh media the cells grew and multiplied as before. The ordinary amœbocytes were the only structural elements in the blood which multiplied in tissue cultures. Evidence leads to the conclusion "that the blood cells, after their differentiation from the mesoderm during embryological development, simply maintain their numerical equilibrium in larvæ and adults by dividing mitotically at certain intervals."

Development of Color Markings.—Onslow ('16, Biochemical Journal, 10:26-30) has studied the development of the black markings on the wings of *Pieris brassicæ* and finds that they are caused by the oxidation of a "colourless chromogen by a tyrosinase," a ferment which is supplied from the body-lymph of the pupa, "possibly by means of the wing-nervures," to the chromogen which has previously appeared in the regions destined to become black. The form of the markings is determined by the particular position of the chromogen. The oxidation occurs just previous to the emergence of the imago and as soon as the oxygen of the air comes in contact with the surface of the wing.

Effect of Cold on Malaria Parasites.—King ('17, Journ. Exp. Medicine, 25:495-498) has investigated the validity of the older assumption that the development of malaria parasites in *Anopheles* is arrested at a temperature of about 60 degrees F. and that the parasites themselves are destroyed at lower temperatures. A series of experiments with *Plasmodium vivax* (the parasite of tertian malaria) in the mosquito *Anopheles quadrimaculatus* showed that it can survive exposure to a temperature of 30 degrees F. for 2 days, 31 degrees F. for 4 days, and a mean temperature of 46 degrees F. for 17 days. In a smaller series of experiments with *Plasmodium falciparum* (the estivo-autumnal parasite) in the same species of mosquito, the sporonts showed a 24 hour resistance to temperatures as low as 35 degrees F.

Nuclear Size in Nerve Cells.—Smallwood and Phillips ('16, Journ. Comp. Neurology, 27:69-75) have studied the nuclear size in the nerve cells of the antennal lobe of the honey-bee. Material from twelve different stages of the life cycle showed a definite variation in the size of the nuclei which cannot be explained as due to the effect of fatigue or old age, but may be interpreted as "the normal variation present in these cells." It is thought that the cells and their parts, such as nuclei, are the variable factors that are responsible for the variation in the tissues and organs. "In place of definite nuclear change with age, we find a constant variation which tends to rhythmic."

Classification of Diptera.—Malloch ('17, Bull. Ill. State Lab. Nat. Hist., 12:161-409) has recently published a very useful paper, "A Preliminary Classification of Diptera, exclusive of Pupipara, based upon Larval and Pupal Characters, with Keys to Imagines in certain Families." This paper is intended to meet the growing need of taxonomic and economic entomologists, animal ecologists, and others whose work would be facilitated by a synoptic treatment of the immature stages of Diptera. It is rich in keys and descriptions of the larval and pupal stages of species found in central United States, containing, in addition, concise information for the different groups on habits, habitats, geographical distribution, and important literature. Twenty-nine excellently executed plates including three hundred seventy-three drawings of various life history stages and structural detail add much to the usefulness and clearness of the paper.

Biology of Fireflies.—Williams ('17, Journ. N. Y. Ent. Soc., 25:11-33) reports the results of an extended study on six species of American fireflies, *Photinus consanguineus, Photinus scintillans, Ellychnia corrusca, Lucidota atra, Pyratomena* sp., and *Photurus pennsylvanica.* Of these, the last named is the most brilliant and the second named the faintest in luminescence in the adult stage. The larval light producing organ in *Photurus* and *Photinus* differs from the adult one which replaces it at maturity. The chief function of the light produced by adults is to bring the males and females together. The larvæ are all luminescent, the light appearing at two points on the eighth abdominal sternite. Luminescence also occurs in the pupal stage. Eggs are faintly luminous, at least for a short time. The larvæ are probably all carnivorous, but among the adults all seem to be herbivorous except the female of *Photurus* which is carnivorous. In most cases, the larval life extends over the greater part of two years. *Ellychnia corrusca* hibernates as an adult, but all the others hibernate as larvæ.

PAUL S. WELCH.

Kansas State Agricultural College.

NOTES ON OLIGOCHÆTA

Development of Genital Organs.—Gatenby ('16, Quart. Journ. Micr. Sci., 61:317-336) reports results of a study on "The Development of the Sperm Duct, Oviduct, and Spermatheca in Tubifex rivulorum." The gonads are formed very early but not until the worm is nearly half grown do the other parts of the genital organs begin to appear and the ducts are not fully developed until some of the genital products are ripe. The spermatheca begins to appear in X while the sperm duct is still incomplete and very rudimentary. The oviduct is the last to be developed. "The more highly differentiated structures begin to develop first, while the oviduct, which is very simple, appears quite late." No satisfactory evidence of dimorphism of spermatozoa, such as is reported by Dixon (see below), was found. There is also disagreement with Dixon's statement that testes cannot be found in the adult because they have been completely enclosed in the sperm sac, Gatenby hold-